Cost-**e**fficient methods and processes for **sa**fety **r**elevant embedded systems

Component-based Development in the CESAR Project

Kung-Kiu Lau
School of Computer Science
The University of Manchester
UK
kung-kiu@cs.man.ac.uk

ARTEMIS Call 2008 Project

CESAR

project partners

An **ARTEMIS** project
(advanced research and technology for embedded intelligence and systems)
jointly sponsored by ARTEMISIA
(the ARTEMIS Industry Association)
http://www.artemisia-association.org/
and the European Commission

Consortium:

- 55 Partners
- 4 Domains
- Key European players from Industry, Tool Vendors, Academics
- Further Assisting Parties

Project Figures:

- Duration: 3 years (Start 03/09)
- Effort: 5124 MM ~ 142 MY/Y
- Total Budget: 58.535.000 €
- Total Funding: 28.317.000 €

Motivation and Objectives

"New" Challenges:

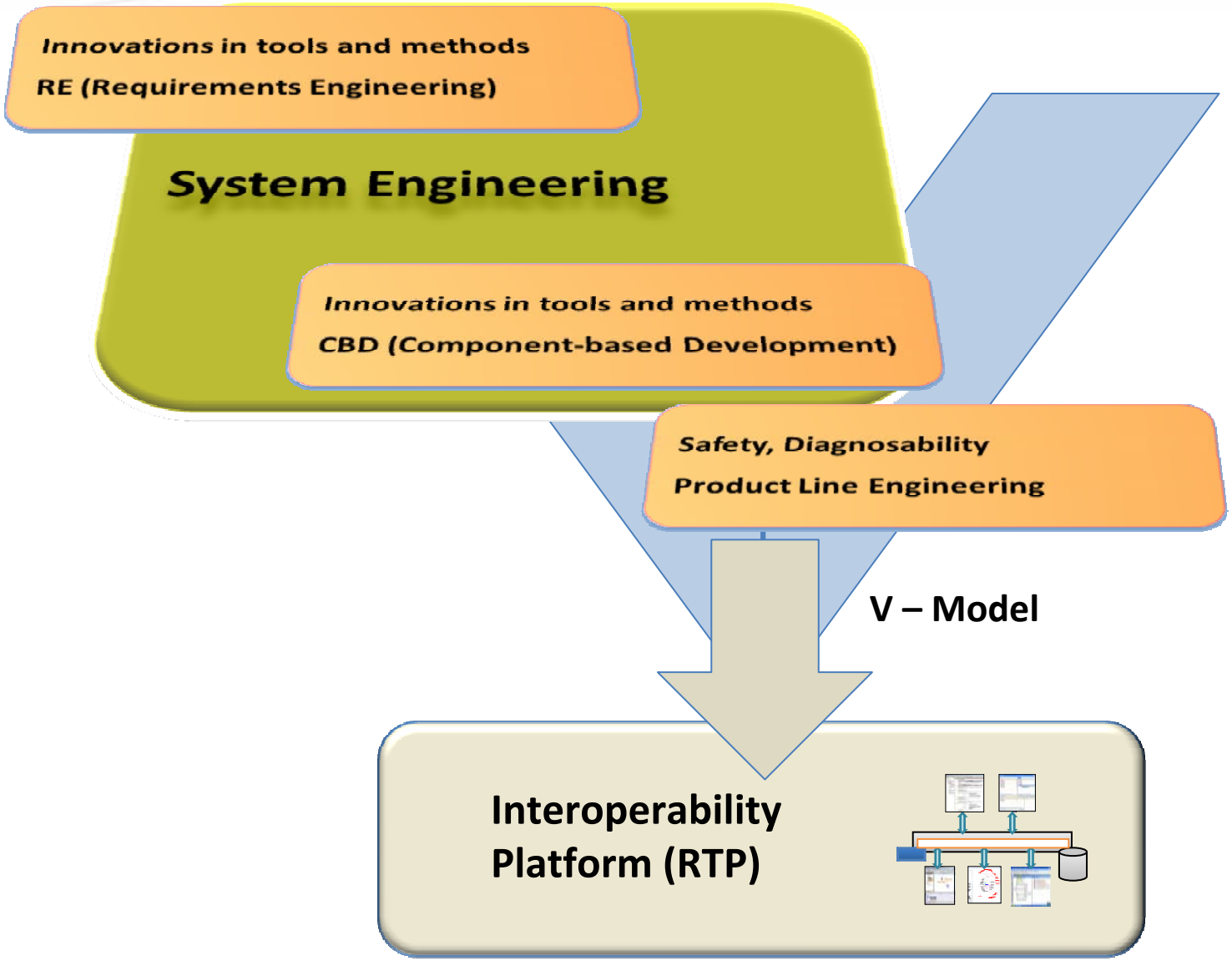
- Complexity, Safety, Quality, Costs…

Objectives:

- Improvement of processes and methods
- Development of a reference technology platform (RTP)
- Reduce development costs



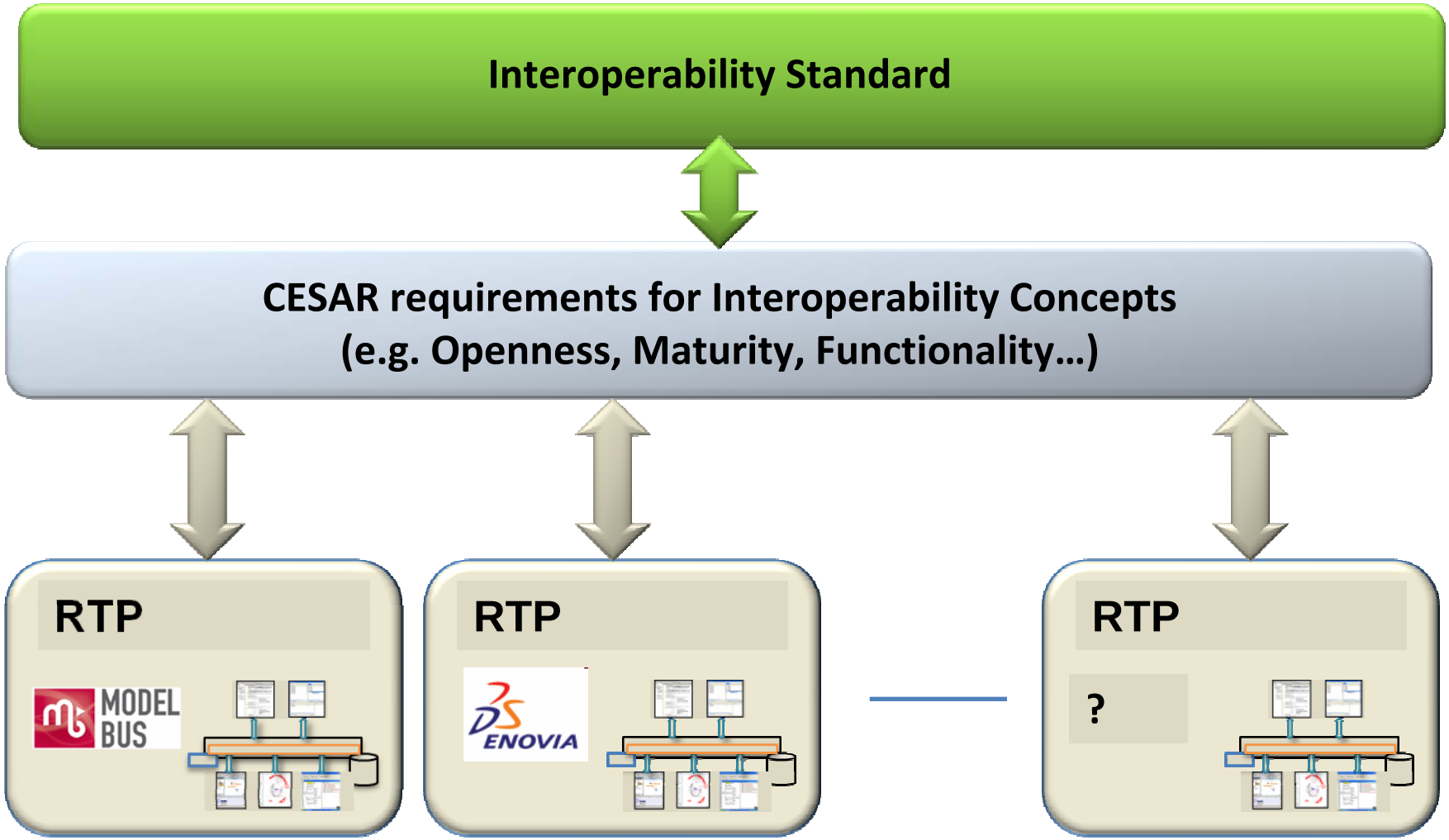

Objective: Cost Reduction



Strategy


RTP
MODEL BUS
CBD
SCADE SUITE
AUTOSAR
CESAR
RE
ENOVIA
IBM
REQTIFY CPM

Objective: Ecosystem



Work Programme

SP0
- Project Management

SP1
- RTP (Reference Technology Platform)

SP2
- Requirements

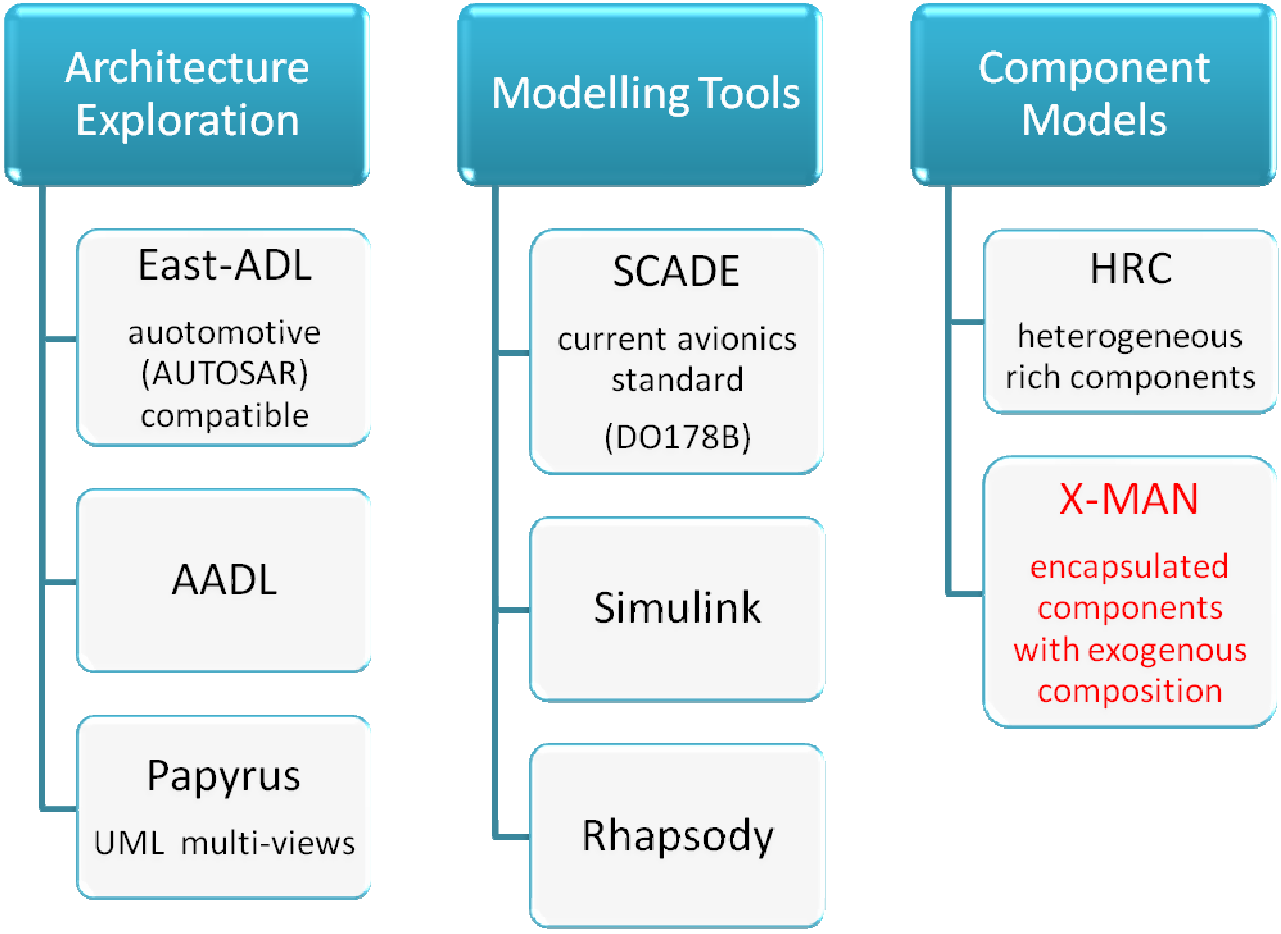
SP3
- CBD (Component-based Development)

SP5
- Automotive Domain

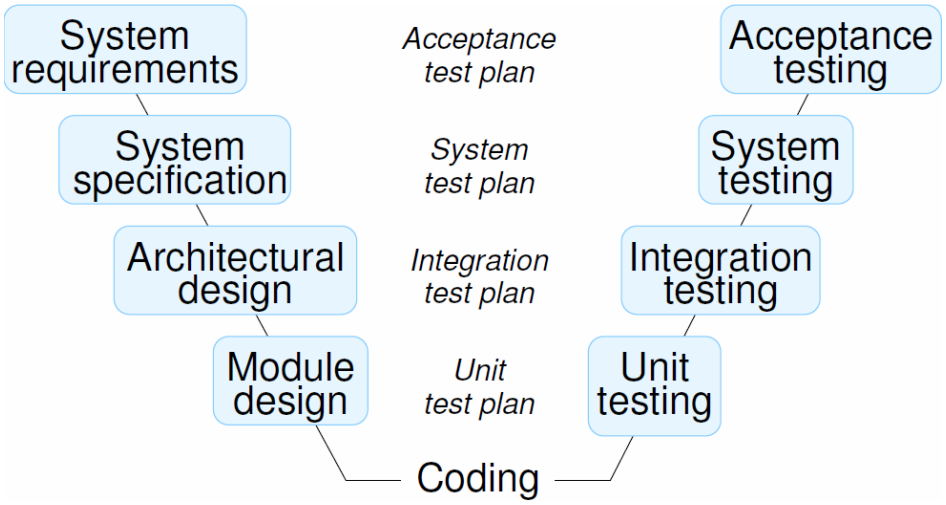
SP6
- Aerospace Domain

SP7
- Railways and Automation Domain

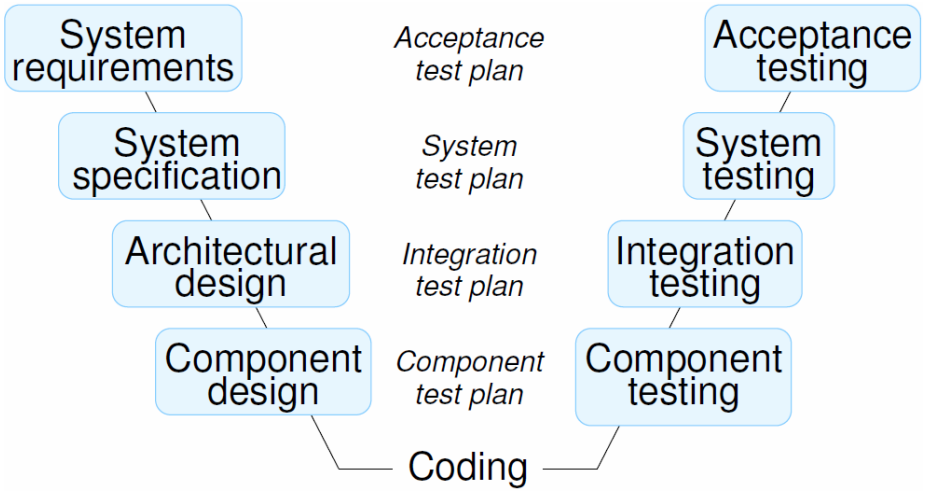
SP3: CBD


Architecture Exploration
East-ADL
autotomotive (AUTOSAR) compatible
AADL
Papyrus
UML multi-views
Modelling Tools
SCADE
current avionics standard
(DO178B)
Simulink
Rhapsody
Component Models
HRC
heterogeneous rich components
X-MAN
encapsulated components with exogenous composition

SP3: V & V

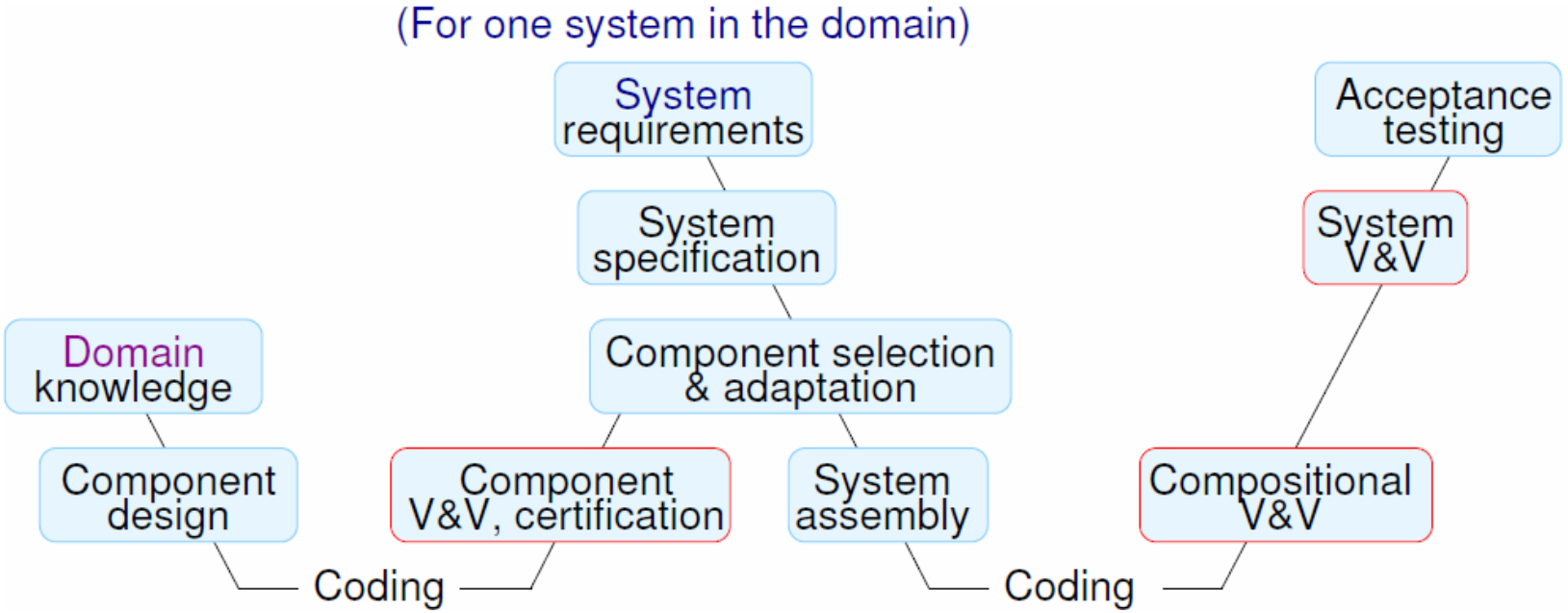


Traditional V Model



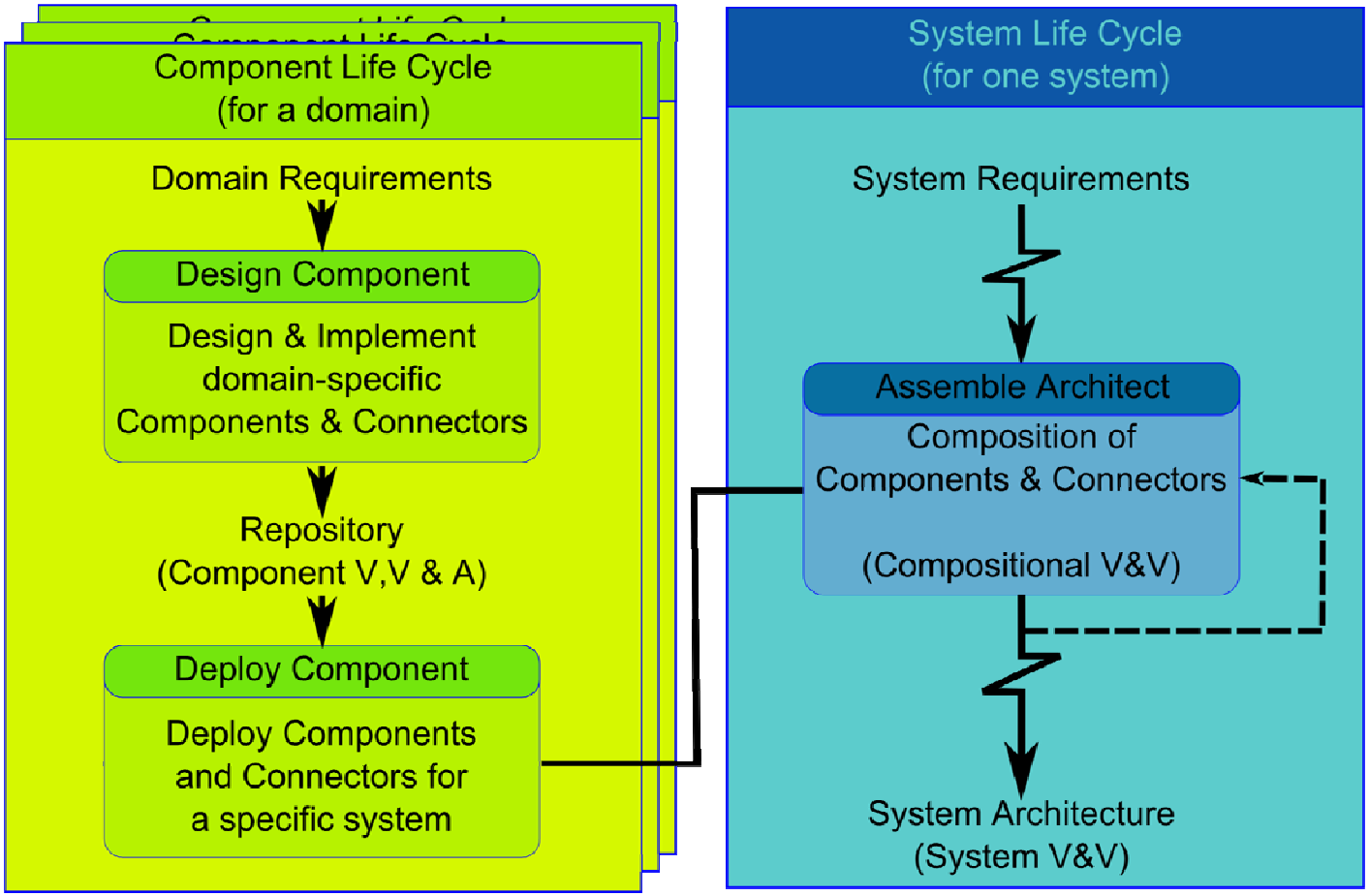
Adaptation of V Model or CBD

SP3: Compositional V & V



The W Model for CBD

SP3: Compositional V & V



Pilot Applications

SP0: Project Management

SP1: RTP (Reference Technology Platform)

SP2: Requirements

SP3: CBD (Component-based Development)

SP5: Automotive Domain

- Brake-by-wire

SP6: Aerospace Domain

- Doors Management, Fuel Management

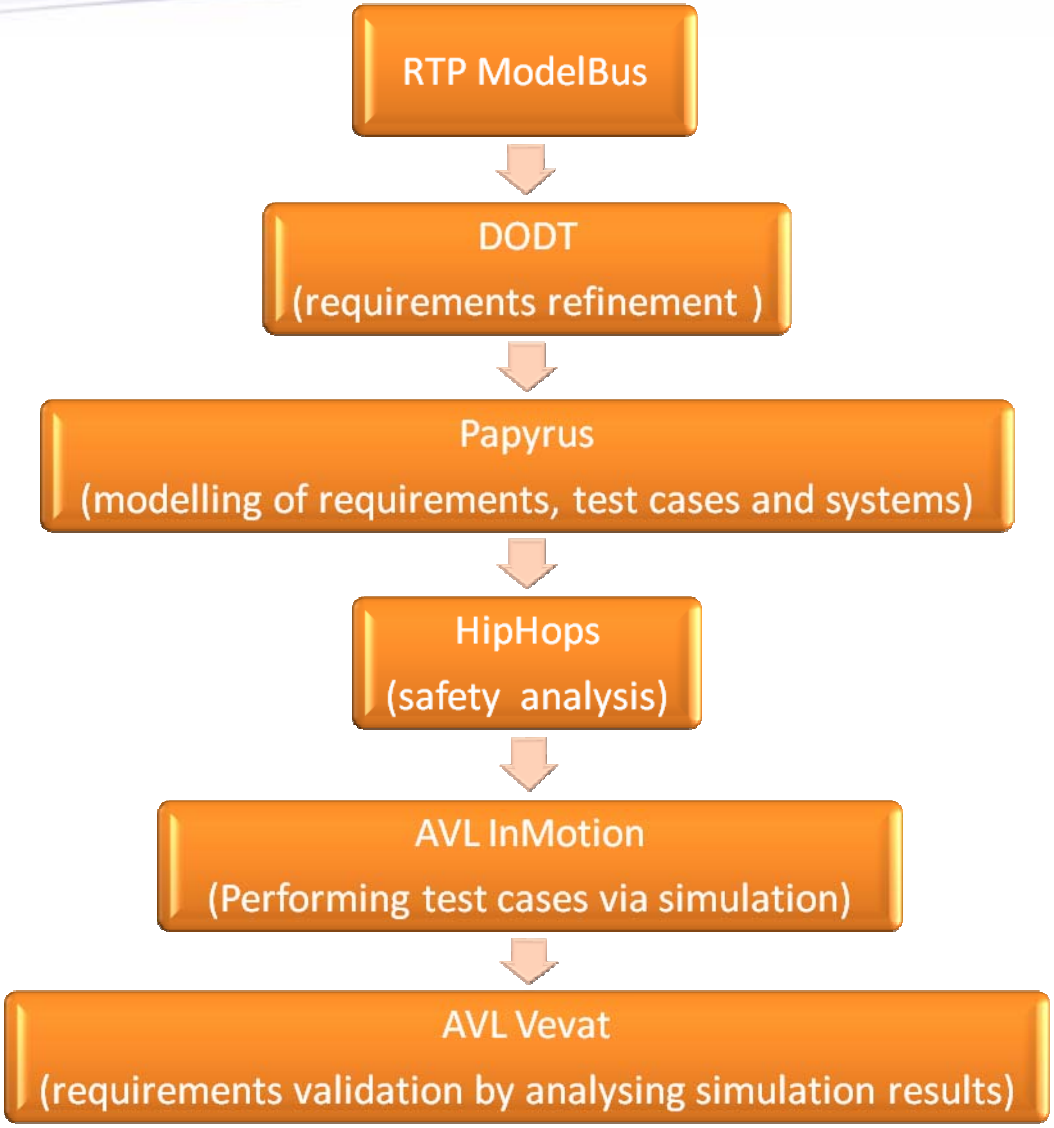
SP7: Railways and Automation Domain

- ?

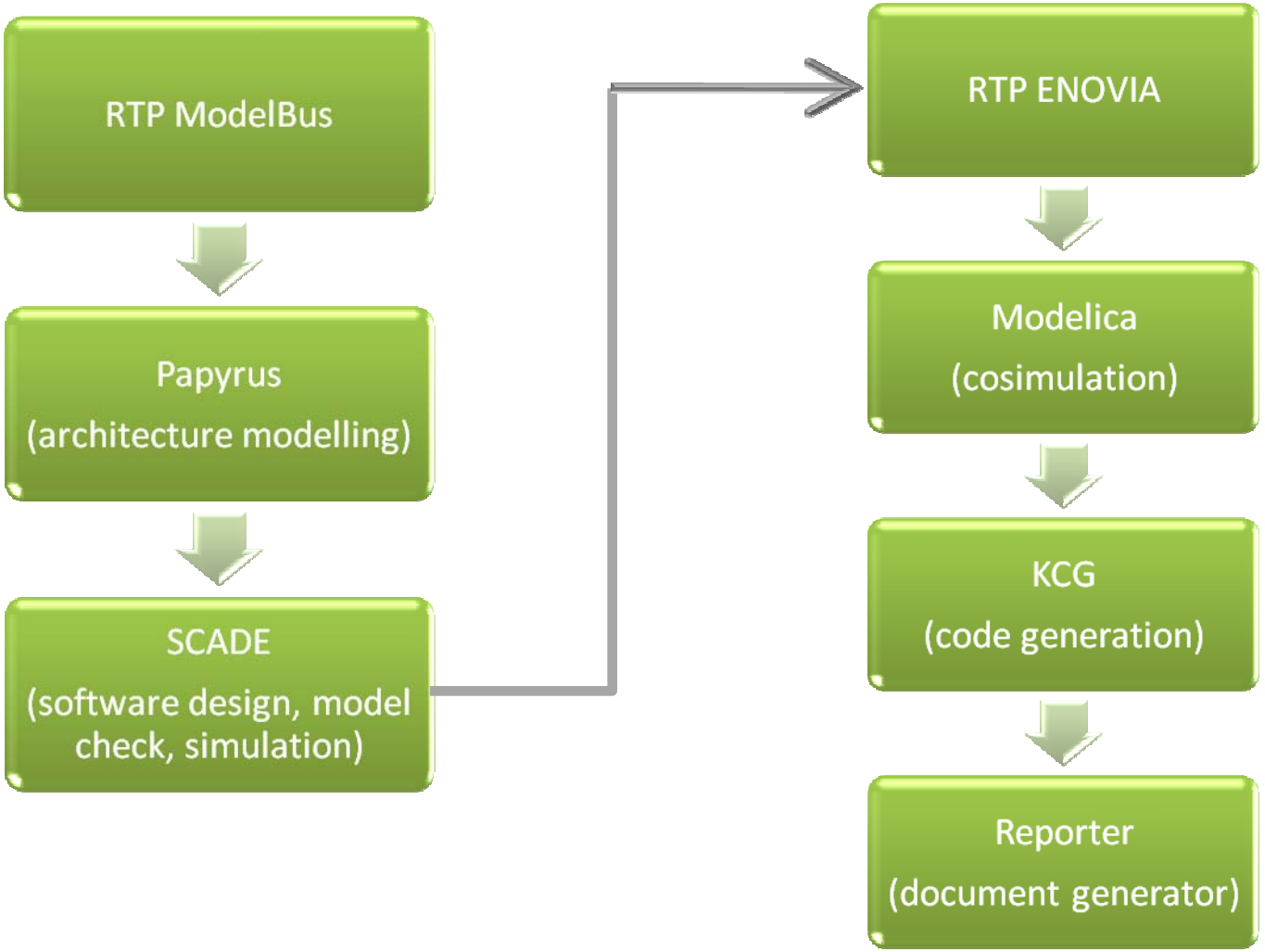
RTP Tool Chains

- Architecture exploration
- Automotive
- SCADE
- Simulink-AADL modelling and analysis
- X-MAN
- Detailed design
- Product lines

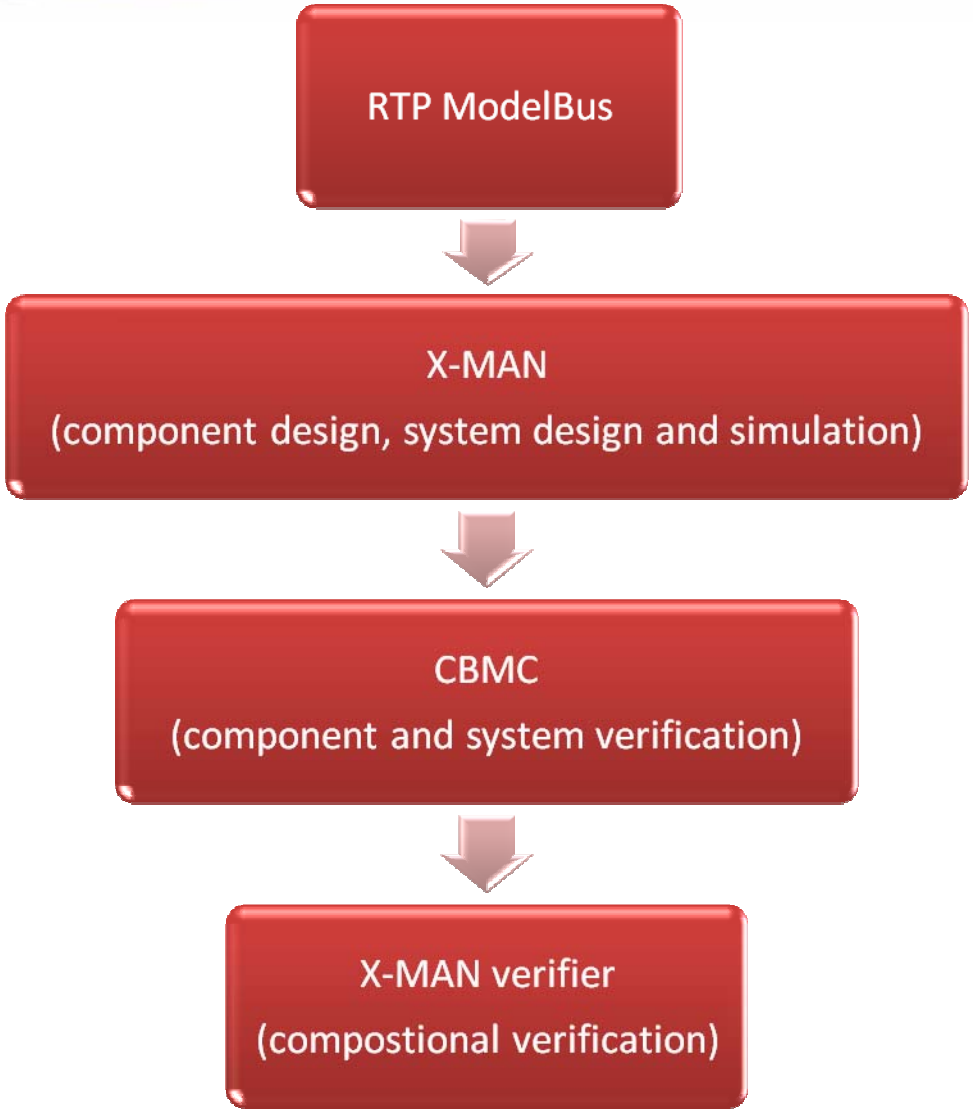
RTP Tool Chains: Automotive



RTP Tool Chains: SCADE



RTP Tool Chains: X-MAN



Summary

CESAR is a large-scale industrial project

- many key industry players
- improve methods and processes
- reduce development cost
- increase system complexity
- ensure safety, reliability, ...

CBD adopted as key technology

- different views on CBD
- different processes/tools
- different domains
- CBD tool chains for multiple domains
- can CBD meet the challenge?